



## Concept 1.1 - Lesson 1

## The Cell as System

❖ Living organisms include humans, animals, plants and also micro-organisms that we cannot see with our naked eye. \* \*

تشمل الكائنات الحية البشر والحيوانات والنباتات وكذلك الكائنات الحية الدقيقة التي لا يمكننا رؤيتها بالعين المجردة.

❖ Bodies of living organisms consist of a group of systems.

\*تتكون أجسام الكائنات الحية من مجموعة من الأنظمة.

❖ Any system in a living organism's body is build up of tiny structures called The Cell

\*أي نظام في جسم الكائن الحي هو بناء اجزاء صغيرة تسمى الخلية

## The Cell

It is the main building unit of living organism's body

- Cells are found only in **living organisms** and not found in non-living things.

- Cells are very small. We need a **microscope** to see them.

توجد الخلايا فقط في الكائنات الحية ولا توجد في الكائنات غير الحية -





الخلايا صغيرة جدا. نحن بحاجة إلى مجهر لرؤيتهم -

- Both plants and animals are living organisms made of **cells**.

→ The cells of plants and animals are different in **shape** and **size**.



Animal cell

Plant cell

## The size of cells

The length of most of cells are tiny, where:

- The length of common animal cells and plant cells ranges between **0.1 mm and 0.005 mm**, so we need microscope to see them.
- Some cells may be too large and you can see them with your naked eye such as :



**unfertilized bird egg** that contains only one big cell.

طول معظم الخلايا صغيرة ، حيث :

\* يتراوح طول الخلايا الحيوانية الشائعة والخلايا النباتية بين

0.1 مللي متر و 0.005 مللي متر ، لذلك نحن بحاجة للمجهر لرؤيتها.

\* قد تكون بعض الخلايا كبيرة جدا ويمكنك رؤيتها مع

عينك المجردة مثل:

بيضة طائر غير مخصبة تحتوي على خلية واحدة كبيرة فقط.

**Note:** **Bacteria** is a living organisms made up of only one cell with length less than **0.005 mm**





What Do You Already know About the cell as a system

»Living organisms grow and reproduce by increasing the **number** of cells.

During the growth of a living organisms,

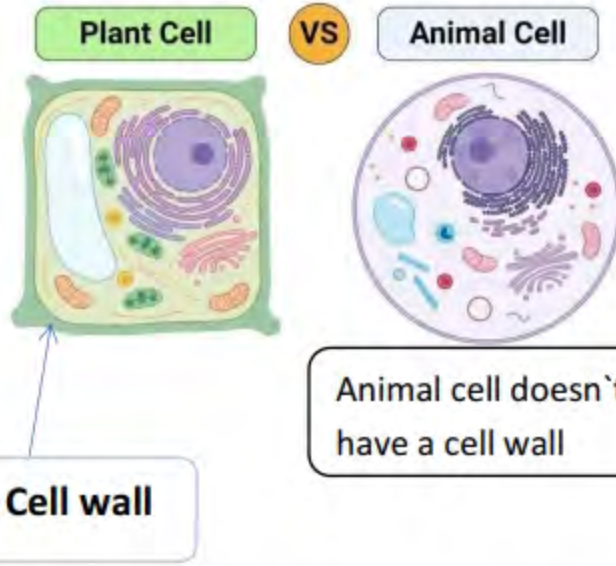
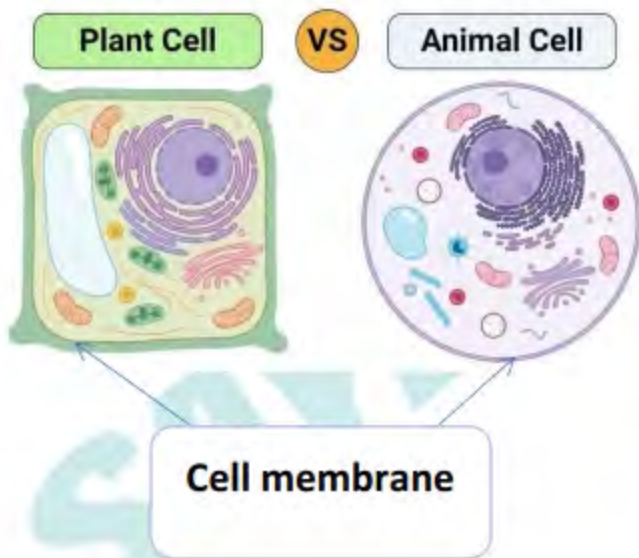
The cells **don't increase in size.**



Properties (Characteristics) of Cells:

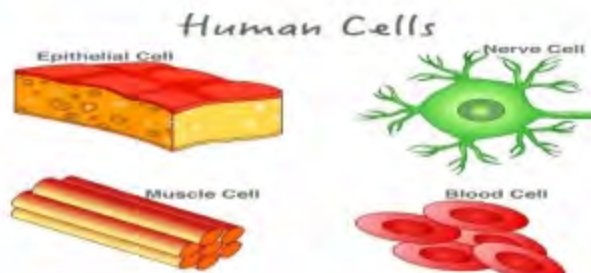
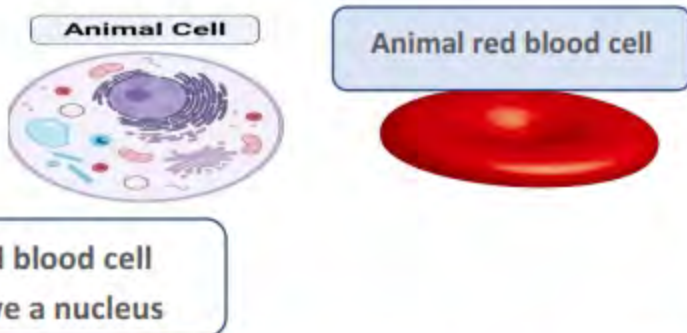
All cells have a cell membrane

Not all cells have the cell wall



Not all cells have a nucleus

The cell of one living organism are not identical



**Note:**

The body of some living organisms are made up of:

- Many cells such as Human body.
- One cell only such as bacteria.



Muscle cell



Nerve cell



Red blood cell

## Cell Needs

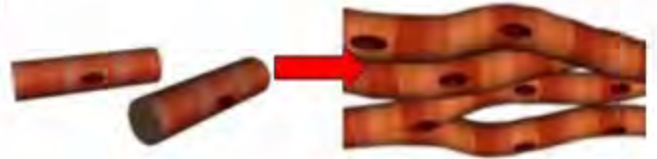
- During the growth of a living organism, the new cells are formed from cells that were already existed in its body.

- أثناء نمو الكائن الحي ، تتشكل الخلايا الجديدة من خلايا كانت موجودة بالفعل في جسمه.

Single Cell  
(muscle)



Muscle Tissue

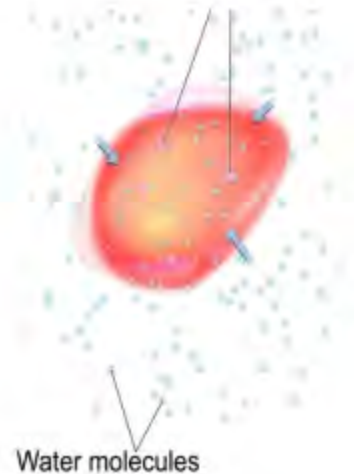


### What are the needs of the cell ?

- The cell needs energy to carry out all its own life activities to survive and get rid of waste materials.
- The cell needs some materials such as:
  - o Water to stay alive.
  - o Food (nutrients) and oxygen to get energy.

ما هي احتياجات الخلية ؟

- تحتاج الخلية إلى الطاقة للقيام بجميع أنشطة حياتها الخاصة للبقاء على قيد الحياة والتخلص من النفايات .
- تحتاج الخلية إلى بعض المواد مثل :



Water molecules



## ► How does the cell get its need of water?

-Water enters the cell through a membrane that surrounds the cell known as "the cell membrane"

-But, if there is much water enters the cell, it will swell until it bursts.

-يدخل الماء إلى الخلية من خلال غشاء يحيط بالخلية يعرف باسم "غشاء الخلية"

-So the cell membrane allows water to go outside the cell to keep the water balance on both sides of the cell membrane (ie, inside and outside the cell)

-ولكن ، إذا كان هناك الكثير من الماء يدخل الخلية ، وسوف تنتفخ حتى تنفجر .  
--لذلك يسمح غشاء الخلية للماء بالخروج من الخلية للحفاظ على توازن الماء على جانبي غشاء الخلية (أي داخل الخلية وخارجها)





## Lesson 1 exercises

**Choose the correct answer**

- The smallest tiny structures that build up all living organism's bodies are.....  
a. systems      b. cells.      c. organs      d. bricks.
- We can see the cell of..... without using a microscope.  
a. bacteria      b. plant      c. human      d. bird's egg
- the ..... is responsible for the entry and exit of into and f the cell.  
a. cell membrane      b. muscle cell      c. nucleus      d. bone cell
- The number of cells which build up a baby's body is..... which build up his father's body.  
a. more than      b. less than      c. equal to      d. double
- The structure which is present in plant cell and not in animal cell is.....  
a. cell membrane only.      b. cell wall only  
c. cell membrane and nucleus      d. cell wall and nucleus.
- The cell needs..... to get its needed energy and to stay alive.  
a. oxygen only      b. water only  
c. food and water only      d. food, oxygen and water
- Growth of a living organism is resulted from increasing the..... of cells in its body  
a. length      b. size.      c. number      d. mass



8. The body of..... composed of one cell only
- a. human      b. bacteria      c. a big tree      d. an elephant
9. All the following living organisms bodies are build up of many cells...except.....
- a. human.      b. fish.      c. plant.      d. bacteria.

**Put(✓) or (X):**

1. We can see the cells of all living o s with the eye. ( )
2. All living organisms are similar in that they are made up of one cell only. ( )
3. The new cells are formed from other cells existed in the body of a living organism. ( )
4. All animal cells have a nucleus. ( )
5. The cells that are present in different living organisms are not similar. ( )
- 6 Growth of living organisms depends on increasing the number of cell in living organism's body. ( )
7. The cell get its energy from nutrients only. ( )
8. The cell membrane allow water to go inside and outside the cell. ( )
9. Cell is the building unit of both living organisms and non-living things ( )
10. The cells that build up a fish body are similar to that of onion plant. ( )

**Write the scientific term of each of the fallowing**

1. The main building unit of the living organisms body that can do all vital processes.
2. The component of cell that allows water to enter and exit the cell.
3. A device that is used to see the structure of living organisms' cells







3. The number of cells increased in the body of a baby

.....

**Look at the opposite figure, then answer the following questions**

1. This device is called.....

2. If the examined cell has a cell wall it may be a cell of.....

- a. lion's body                      b. leaf  
c. human body                      d. mouse body.

3. This device must be used to see the structure of all the following cells, except.....

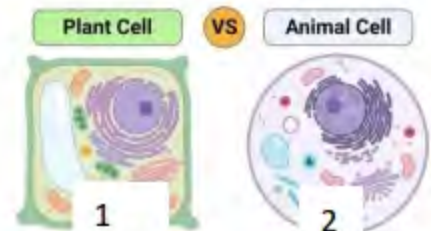
- a. plant cells.                      b. human body cells.  
c. bacteria cells                      d. unfertilized bird's egg



**Look at the opposite figure, which show the structure of different cells then complete the sentences below**

1. The cell wall is found only in cell number.....

2. By examining a part of your skin under microscope you can see the same structure of the cell number.....





## Lesson 2

## Brief History of the cell

- The microscope was invented in the 17th century.
- In 1665, **Robert Hooke** used his microscope to observe the tiny particles of some samples of plant parts that cannot be seen by naked eye, and he named each of these tiny particles "**the cell**".



تم اختراع المجهر في القرن ال 17.

\*في عام 1665 ، استخدم روبرت هوك مجهره لمراقبة الجسيمات الدقيقة لبعض عينات أجزاء النبات التي لا يمكن رؤيتها بالعين المجردة ، وأطلق على كل من هذه الجسيمات الدقيقة اسم "الخلية".

Later, the modern microscopes help scientists to discover more information about the cell and they exchange this information between each other, such as:

في وقت لاحق ، تساعد المجاهر الحديثة العلماء على اكتشاف المزيد من المعلومات حول الخلية ويتبادلون هذه المعلومات بين بعضهم البعض ، مثل:

- The nucleus that is found inside many cells.
- The different parts of the cell and their functions.
- The cell is the building unit of living organisms' bodies
- The body of some simple living organisms consists of one cell only.



\* النواة التي توجد داخل العديد من الخلايا.

\* الأجزاء المختلفة من الخلية ووظائفها.

\* الخلية هي وحدة بناء أجسام الكائنات الحية

\* يتكون جسم بعض الكائنات الحية البسيطة من خلية واحدة فقط.

- The body of living organisms that contains complex systems consists of many different cells.



### Using a Microscope to view cells

#### Structure of the microscope:

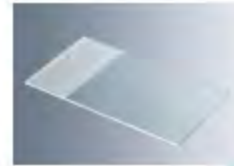


Note: the objective lenses have different focusing power to form different degrees of magnified images to allow us see the components of the cells

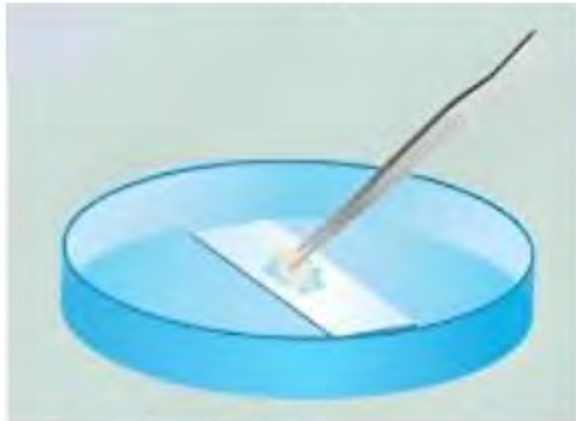


### Preparing a slide of plant cells:

#### Tools:

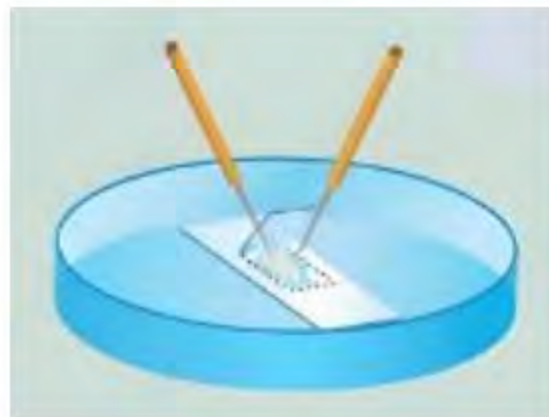


#### Steps:



1 Place the thin membrane of an onion in the center of a glass slide.

2 Add 3 drops of distilled water





- 4 Examine the sample under the compound microscope.

- 3 Carefully place the coverslip over it.

- 5 Repeat the previous steps on a slide of skin of an animal.

### Using the microscope to examine the slide

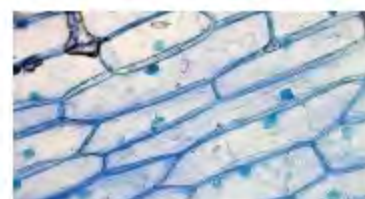
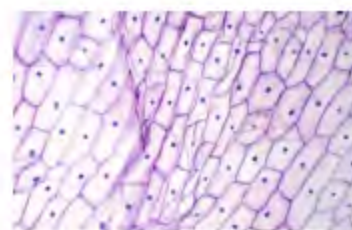
#### Steps

1. Put the slide on the stage and fix it with the stage clip
2. Choose the suitable objective lens and look through the eyepiece
3. Rotate the coarse focus and the fine focus to see a clear image for the sample on the slide.



#### Observations

- 1- When you examine the low power objective lens, you will see the cells in small size as shown in the opposite figure.
- 2- When you examine the slide using the high power objective lens, you will see the cells in bigger size as shown in the opposite figure.





## Lesson 2 exercises

## Choose the correct answer:

1. Microscopes help scientists to discover that..... is the building unit of living organisms bodies
  - a. brick
  - b. cell
  - c. the Sun
  - d. energy
2. The body of simple living organisms as bacteria consists of.....
  - a. one cell only
  - b. many cells
  - c. different cells
  - d. ten cells only
- 3 You can see the cells of all the following under microscope, except.....
  - a. Onion
  - b. human skin
  - c. leaf
  - d. stone
4. All the following are from parts of microscope, except.....
  - a. eyepiece
  - b. stage
  - c. covers
  - d. mirror.
5. When you examine a piece of onion under microscope using the low power objective lens, you will see the cells of onion in..... size
  - a. small
  - b. medium
  - c. big
  - d. very big
6. The modern microscope help scientists to discover all the following information about the cell, except that.....
  - A. the cell is the building unit of living organisms bodies
  - b. some simple living organisms consists of one cell only
  - c. living organisms that contain complex systems consists of many
  - d. all living cells have the same parts which have the same function



Put (✓) or (x):

1. Robert Hooke used his microscope to observe cells of some samples plant parts ( )
2. The body of a living organism that contains complex systems consists of one cell only ( )
3. All objective lenses of microscope have the same focusing power. ( )
4. The modern microscopes help scientists to discover more information about the cell. ( )
5. We can see the examined sample in bigger size when using the high power objective lens ( )
6. The function of coarse focus and fine focus is making the image of sample very clear under microscope ( )

**Complete the following sentences using the words below:**

**(low power-objective lenses-the cell-small-living organisms)**

1. Robert Hooke named the tiny particles that he saw under his microscope  
With .....
2. The cell is the building unit of .....bodies
3. Different focusing power of..... allow us to see the components of cells
4. You can see cells of an examined sample in.....size by using the objective lens of the microscope

**Give reasons for:**

1. Scientists tend to use microscopes in their researches



2. We must rotate the coarse focus and fine focus during examining a sample under microscope under microscope

### What happens if...?

1. Scientists was not invented the microscopes

2. You examine a sample of plant cells lens of using the low power objective microscope

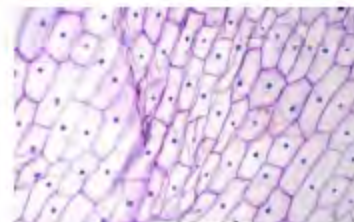
### Look at the opposite figures, then answer the following questions

1. The opposite figures represent,,,,,,,,,,,,,,,,,,,,,

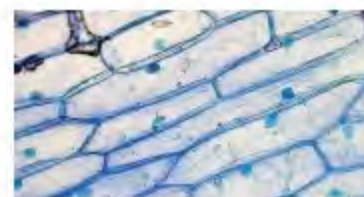
which are the building unit of a plant.

2. Which figure indicates that we use the low power objective lens of a microscope? (Give reason for your answer).

3. Which figure indicates that we use the high power objective lens of a microscope? Give reason for your answer).



1



2





## Lesson 3

## The parts of the cell

Living organisms are divided into

unicellular  
organisms

- They are living organisms that their bodies consist of only one cell.
- Example: bacteria



multicellular  
organisms

- They are living organisms that their bodies consist of many cell.
- Example: Humans, plants & animals.



G. R

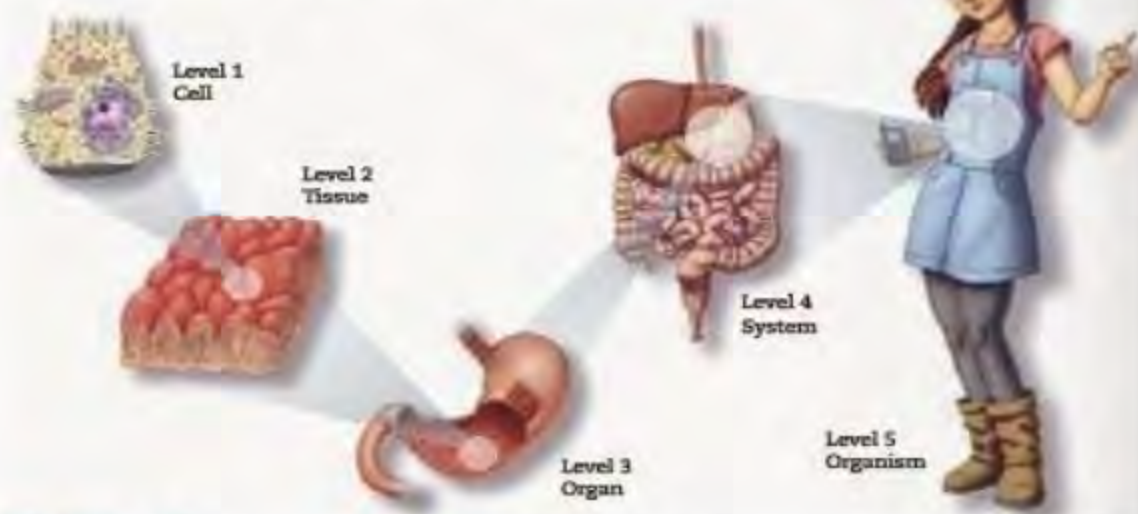


- **Bacteria are unicellular organisms.**
  - Because their bodies consist of one cell only.
- **A horse is one of the multicellular organisms.**
  - Because its body consists of many cells.

### Structure of multicellular organisms' bodies:

The structure of most of the multicellular organisms' bodies are organized into five levels, which are:

## Levels of organization



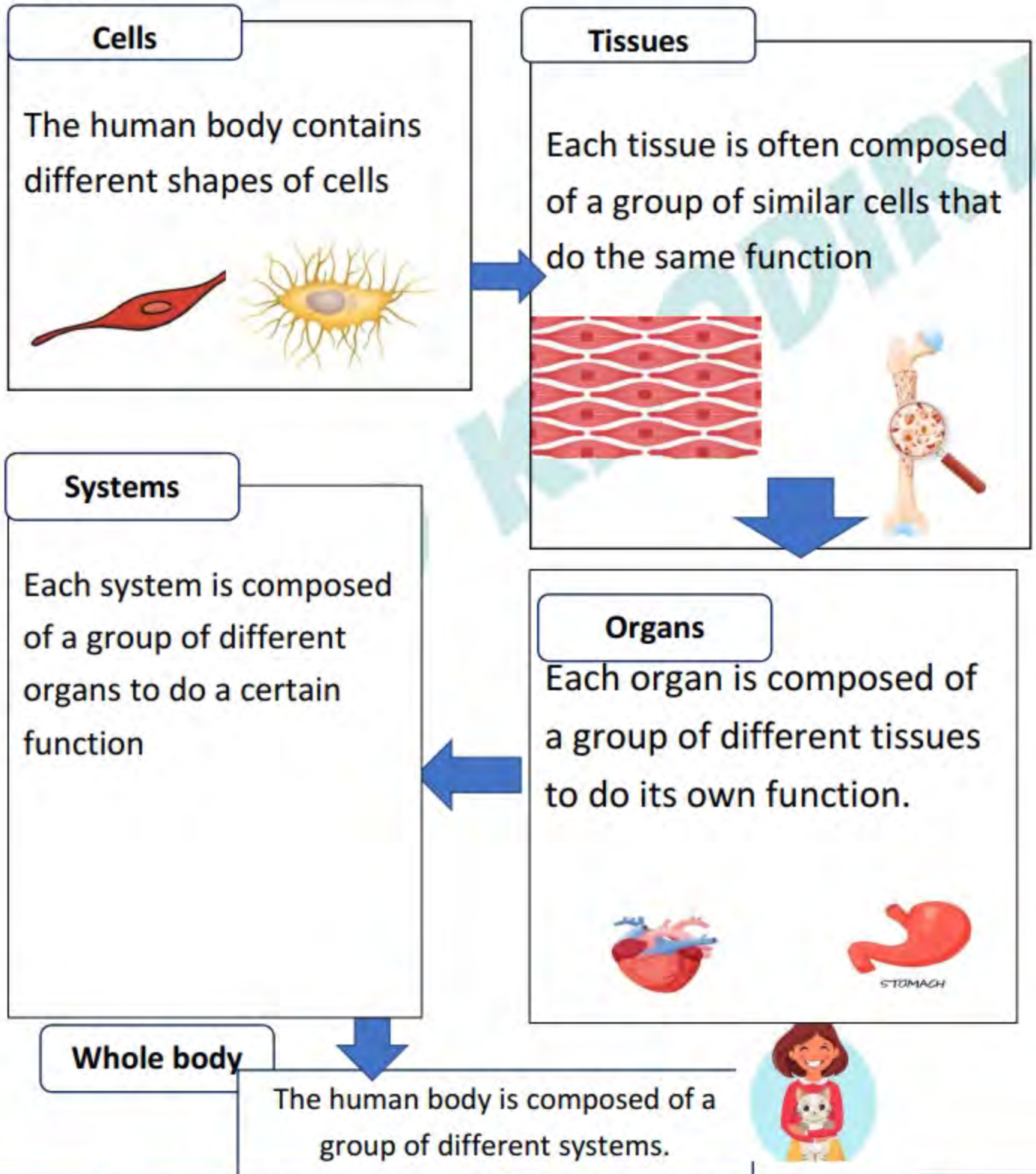
» Each level plays a specific role related to that organism's structure and function.

Level	Definition	Examples
<b>Cell</b>	The basic (smallest) unit of life.	Stomach cells
<b>Tissue</b>	A group of similar cells that share a common origin and perform the same function.	Stomach tissues
<b>Organ</b>	A group of tissues involved in performing a particular function.	Stomach
<b>System</b>	A group of organs that perform a	Digestive



	specific function.	system
<b>Entire organism</b>	A group of systems that work together.	Human

The structure of the human body as an example of multicellular organisms:





Cell parts:

Most of animal cells and plant cells are composed of some main parts which are:

- Cell membrane
- Cytoplasm
- Nucleus
- Organelles

### Cytoplasm

It is a gelatinous liquid (thick liquid) which is found inside the cell.

### Nucleus

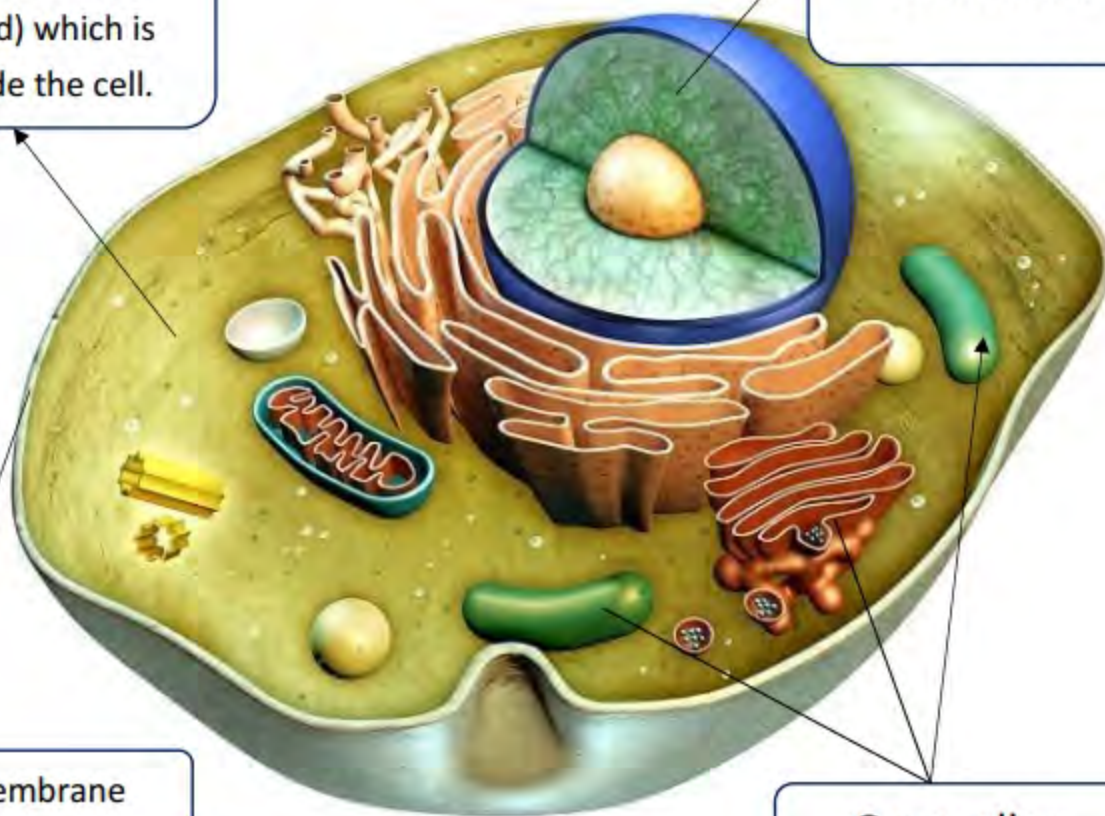
It is often located at the center of the cell

### Cell membrane

It surrounds the cell from outside (especially the animal cell)

### Organelles

They are different tiny structures inside the cell  
Each type of organelle has a special function

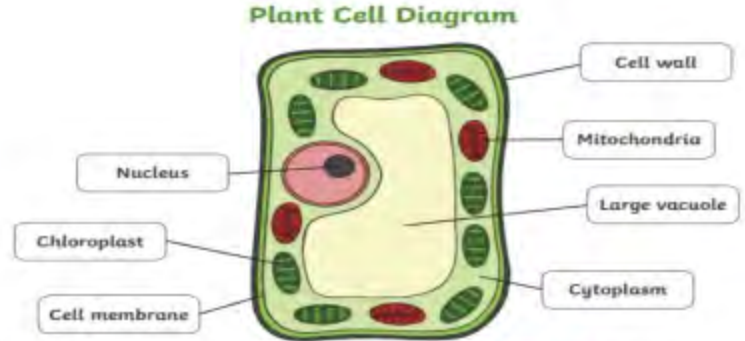




## Notes

1. The plant cell is by a cell wall from outside

2. The cell wall is made up of a substance called cellulose.



3. A special type of plant cell has the ability to make the photosynthesis process as it contains special called chloroplasts.

## The functions of cell parts

- Although the multicellular organisms are made up of many cells that differ in shape

and structure but, there are some similar parts in their structure.

► In this activity, we are going to study the common parts of most cells such as:

- Cell membrane.
- Nucleus.
- Cytoplasm.
- Mitochondria.
- Endoplasmic reticulum
- Golgi apparatus.

على الرغم من أن الكائنات متعددة الخلايا تتكون من العديد من الخلايا التي تختلف في الشكل - وهيكلي ولكن ، هناك بعض أجزاء مماثلة في هيكلها

في هذا النشاط ، سنقوم بدراسة الأجزاء الشائعة لمعظم الخلايا مثل

السيتوبلازم . النواة \* غشاء الخلية.



Mitochondrion الميتوكوندريا.

جهاز جولجي apparatus \* الشبكة الإندوبلازمية

### Cell membrane

It is the outer lining of the cell.

Functions:

1. It protects the cell.
2. It controls the substances that can enter or leave the cell through the "selective permeability" feature

#### Note

**Selective permeability feature** means that the cell membrane allow some substances to pass through it into the cell, while it prevents some other substances from entering the cell.

### Cytoplasm

Function:

It is the gelatinous liquid (thick liquid) inside the cell in which all other cell parts float.



### Mitochondria

They are one of the organelles of the cell.  
-They are known as the "powerhouses" of the cell.

They provide the cell the energy it needs by converting sugar inside the cell into energy through the "cellular respiration".

#### Cellular respiration:

It is the process that takes place inside the mitochondria, where oxygen is used to obtain the chemical energy stored in food to help the cells make their functions.



### Nucleus

**Function:** It controls all the cell activities such as

- Formation of proteins.
- Cell division to form new cells.

### Endoplasmic reticulum

It is one of the organelles of the cell.

**Function:**

It helps in assembling (collecting) and transporting proteins inside the cell to build and repair the cell.

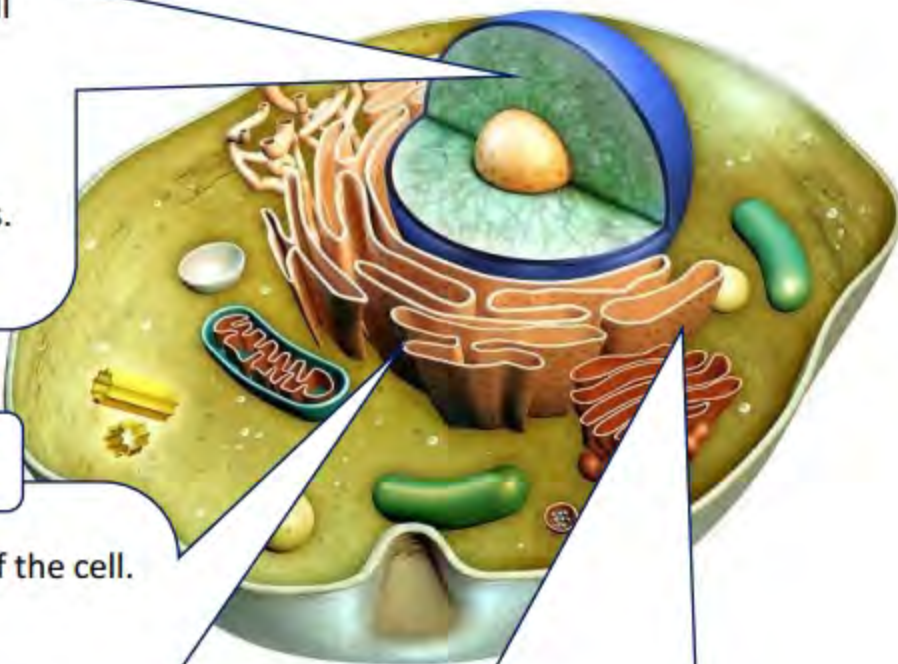
### Golgi apparatus

of the cell.

**Function:**

It helps in packing and transporting different materials:

- between the cells.
- out of the cell





## Lesson 3 exercises

Choose the correct answer:

- The body of unicellular organism consists of .....  
a. three cells only      b. one cell only.      c. six cells only      d. many cells
- All the following organisms are examples of multicellular organisms, except.....  
a. human      b. horse      c. bacteria      d. apple tree
- Which of the following is the correct arrangement of the structure of most of multicellular organisms bodies?  
a. Similar cells → Organs → Tissues. → Systems  
b. Similar cells. → Tissues → Organs → Systems  
c. Organs → Tissues → Systems → Similar cells  
d. Tissues. → Similar cells → Organs → Systems
- Stomach is composed of a group of different.....  
a. bacteria.      b. systems.      c. organs.      d. tissues.
- All the following parts are from the main parts of animal cell, except.....  
a. cell membrane      b. cell wall      c. cytoplasm      d. nucleus
- The gelatinous liquid which is found inside the cell is known as.....  
a. nucleus.      b. cytoplasm      c. cell membrane      d. organelles





7. The structure of plant cell which is made up of cellulose is the.....
- a. cell membrane      b. cell wall.      c. cytoplasm      d. nucleus
8. Plant cell has the ability to make the photosynthesis process due to the presence of..... inside it
- a. mitochondria    b. chloroplasts    c. nucleus    d. cytoplasm
9. The organelles which provide the cell with the needed energy are called.....
- a. endoplasmic reticulum      b. mitochondria
- c. Golgi apparatus      d. cell membrane
10. Selective permeability of cell membrane means that cell membrane controls.....
- a. the energy which is produced inside the cell.
- b. the food which is consumed by the cell
- c. the substances which are transported inside the cell
- d. the substances that can enter or leave the cell
11. All the following are from functions of cell membrane of animal cell, except That.....
- a. it protects the cell.
- b. it has the selective permeability feature.
- c. it provides the cell with the needed energy
- d. it surrounds the cell from outside
12. The two cell organelles which are responsible for transportation process are.....



- a. mitochondria and golgi apparatus.
  - b. endoplasmic reticulum and golgi apparatus.
  - c. endoplasmic reticulum and mitochondria.
  - d. mitochondria and chloroplasts.
13. Nucleus is responsible for controlling.....
- a. formation of proteins only
  - b. cell division only
  - c. formation of proteins and cell division
  - d. formation of proteins and energy production.

**Put (✓) or (x)**

- 1. Bacteria and horse are considered as multicellular organisms (    )
- 2. Respiratory system consists of a group of different organs that do the function of respiration process (    )
- 3. The human body contains about 40 million cells. (    )
- 4. Chloroplasts are found in the cells of banana plant leaves (    )
- 5. The cells of monkey are surrounded by cell wall from outside (    )
- 6. Nucleus is found in the center of most cells (    )
- 7. All cell parts which are found inside the cell are floating in cytoplasm (    )
- 8. Selective permeability feature takes place through the cell wall (    )
- 9. Endoplasmic reticulum is collecting and transporting proteins inside the cell to build and repair the cell (    )



10. Mitochondria convert sugar inside the cell into the needed energy to make the cell do its vital processes ( )
11. Cellular respiration takes place inside cells by the help of golgi apparatus. ( )

**Write the scientific term of each of the following:**

1. They are living organisms that their bodies consist of one cell only.
2. They are living organisms that their bodies consist of many cells
3. It is a gelatinous liquid which is found inside the cell
5. It is often located at the center of the cell
6. They are different tiny structures inside the cell and each type of them has a special function
7. They are cell organelles that provide the cell with the needed energy (
- B. An organelle which helps in assembling and transporting proteins inside the cell to build and repair the cell
9. An organelle which helps in packing and transporting different materials between the cells and out of the cell

**Complete the following sentences**

1. Human is considered as.....organism, because its body consists of many cells.
2. Muscle tissue is composed of a group of..... that do the same function
3. Cells of plants is characterized by the presence of chloroplasts which are responsible for making .....process



4. Plant cell similar to animal cell in the presence of cell membrane,....., ..... endoplasmic reticulum and.....
5. Cellulose makes up..... which is found in..... cells only
6. Cells of dog is surrounded by..... from outside
7. Mitochondria in muscle cells convert.....inside the cells into..... which is needed for doing different exercises.
8. Transporting proteins inside the cell to build and repair it is the function of....., while transporting different materials between the cells is the function of.....

**Give reasons for**

1. Cats are considered as multicellular organisms

.....

2. Plant cells can make photosynthesis process.

.....

3. Both of endoplasmic reticulum and golgi apparatus are involved in transportation process inside and outside the cell

.....

**What happens if**

1. There is no chloroplasts inside plant cells.

.....

2. The cell membrane cannot control the selective permeability feature.

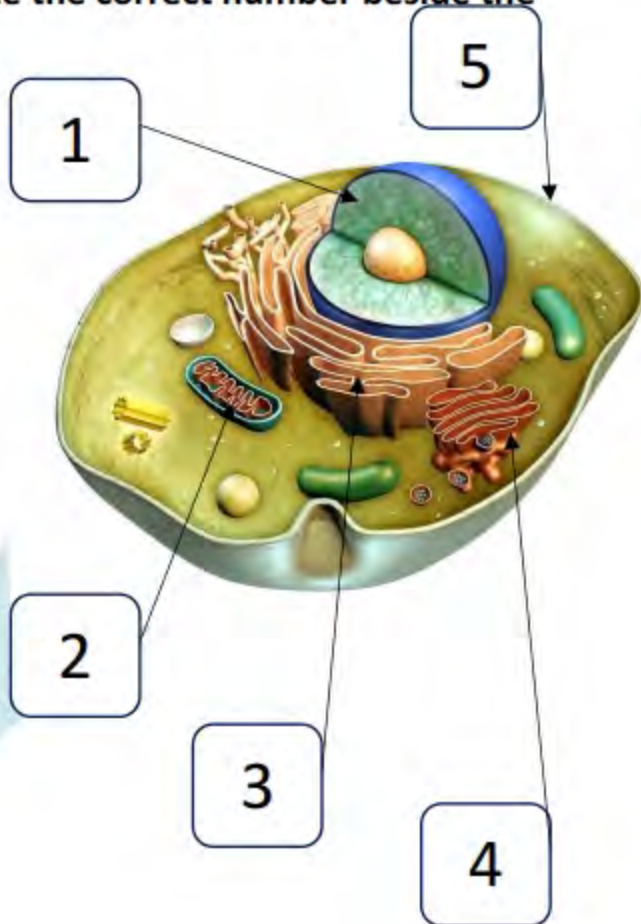
.....



3. Sugar doesn't reach mitochondria inside a cell

Look at the following figure, then write the correct number beside the suitable sentence

1. Powerhouses in the cell.
- 2 Control the cell division.
3. Assembling and transporting proteins
4. Control the selective permeability feature.
5. Packing and transporting different materials





## Comparing plant and animal cells

First let's see some parts that are found in **the plant cell only** and characterize it, which are:

### Cell wall:

- It is made up of cellulose
- It is a rigid (hard) external material that surrounds the cell membrane of the plant cell

**Function:** It surrounds the plant cell to give it a



### Chloroplasts:

- They are sac-like organelles that contain tiny green granules.
- These granules have green color because they contain a green pigment called chlorophyll

### Function:

They have chlorophyll that absorbs the energy of the sunlight for the plant to make its own food through the photosynthesis

### Sap vacuole:

- It is a large sac-like organelle.
- The plant cell has only one special big vacuole called "sap vacuole".

**Function:** It stores nutrients, water and waste materials inside the plant cell.



## Notes

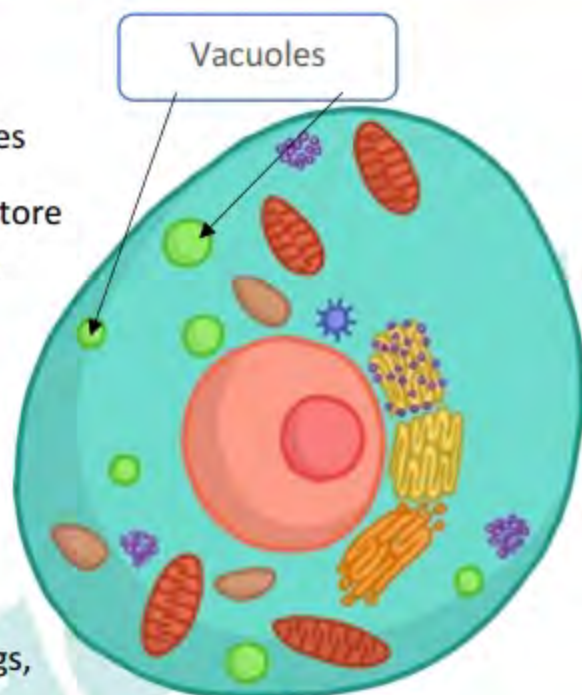
**1. Vacuoles in the animal cell:**

- The animal cell has many and small vacuoles
- Function of vacuoles in animal cell:** They store nutrients, water and waste materials inside the animal cell.

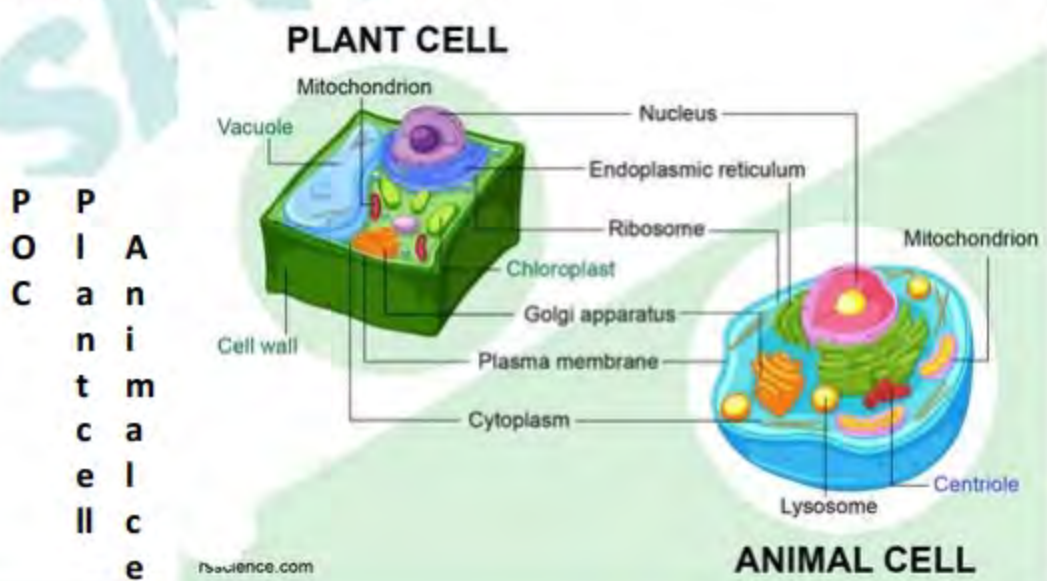
2. The animal cell doesn't have a cell wall, so it doesn't have a definite shape as the plant cell.

3. Animals have other structures to keep their shapes such as:

- Some animals have bones such as cats, dogs, birds... etc.
- Some animals have a hard shell-like cover called "exoskeleton" that gives them their shapes such as some insects.

**Comparing plant and animal cells:**

The following figures and the table in the next page show a comparison between the plant cell and the animal cell.



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## II

Definition	It is the main building unit of plant body	It is the main building unit of animal body
Cell membrane	Present	Present
Cytoplasm	Present	Present
Nucleus	Present	Present
Mitochondria	Present	Present
Golgi apparatus	Present	Present
Endoplasmic reticulum	Present	Present
Vacuole	One big sap vacuole	Many small vacuoles
Chloroplasts	Present	Absent
Cell wall	Present	Absent

Note

Cell organelles include mitochondria, golgi apparatus, endoplasmic reticulum, vacuoles and chloroplasts.

Give reason for

**1. Animals cannot make their own food.**

Because bodies of animals are made up of animal cells which don't have chloroplasts.

**2. The animal cell doesn't have a definite shape.**

Because the animal cell doesn't have a cell wall.

► Complete the following sentences using the words below:

(sap vacuole-cell wall-mitochondria)

- Both animal cell and plant cell contain .....
- The plant cell has one big.....
- The animal cell doesn't have a.....

**Planning a cell city**







## Lesson 5

## Build a cell city

In this activity, you will use your plan for building a cell city that you have developed in the previous activity to create a visual model of a plant cell and another model of an animal cell.

What will you do?

1. Review your plan for building a cell city that you create in the previous activity.
2. Prepare your materials to build your models.
3. Build a model for the plant cell and another one for the animal cell and label the structures of each model.
4. Compare between the two models.



Plant cell city



Animal cell city

**Note**

There are two structures in plant cell that are not found in the animal cell, which are:

1. The stone wall surrounding the city (that represents the cell wall).
2. The food factory (that represents the chloroplast).



## Lesson 4.5 exercises

Choose the correct answer :

- Cellulose forms..... of plant cell.
  - cell membrane
  - cell wall
  - chloroplasts
  - sap vacuole
- The function of cell wall is.....
  - surrounding animal cell to give it a definite shape.
  - storing nutrients, water and waste materials inside the cell.
  - surrounding plant cell to give it a definite shape.
  - making food of plants by photosynthesis process.
- All the following structures are found in onion cells only and not found in fish cells, except.....
  - cell wall.
  - one sap vacuole.
  - chloroplasts.
  - mitochondria.
- All the following are from characters of chloroplasts, except that.....
  - they are sac-like organelles,
  - they contain tiny green granules.
  - they are found in both plant and animal cells.
  - they contain chlorophyll pigment.
- All the following can be stored inside sap vacuole of plant cell, except
  - energy.
  - nutrients.
  - water.
  - waste materials.
- The animal cell doesn't have a definite shape, because it doesn't have .....
  - cell membrane.
  - cell wall.
  - chloroplast,
  - nucleus.



7. All the following animals have bones in their bodies, except.....

- a. cats.                      b. dogs.                      c. birds.                      d. insects.

8. The animal cell cannot make photosynthesis process, because it doesn't

Have.....

- a. nucleus.                      b. chloroplasts.                      c. mitochondria,                      d. sap vacuole.

9. The structure which is found in the cell of a banana tree leaf and not found in the cell of a cat is.....

- a. nucleus.                      b. golgi apparatus.                      c. cell membrane.                      d. cell wall.

10. Most plants appears in..... color due to the presence of chlorophyll pigment in their cells.

- a. yellow                      b. blue                      c. green                      d, red

Put (✓) or (X):

1. Cell wall surrounds the cell membrane of animal cells. ( )
2. There is one big vacuole in the cell of onion plant ( )
3. Chlorophyll is responsible for absorbing the energy of sunlight to make the food of plants. ( )
4. The green color of plants is due to the presence of vacuoles in their cells ( )
5. There are many small vacuoles in the cells of a bind ( )
6. Exoskeleton gives some insects their shapes. ( )
7. Calls of human don't have definite shape due to the absence of cell membrane. ( )



8. The horse can make its own food due to the presence of chloroplasts in its cells.

(     )

**Write the scientific term of each of the following:**

1. It surrounds the plant cell to give it a definite shape.
2. A one big sac-like organelle in the plant cell that stores nutrients, water and waste materials
3. They are sac-like organelles that contain tiny green granules and found in plant cells only.
4. It is a green pigment which absorbs the energy of sunlight to make photosynthesis process in plants.

**Complete the following sentences:**

1. Cell wall is made up of..... and gives the plant cell its definite.....
2. Plant cell contains one big..... which stores nutrients, water and waste materials, while animal cell contains many small..... which do the same function as in plant cell
3. Apple tree leaves can make photosynthesis process due to the presence of..... in its cells
4. The presence of ..... pigment gives most plants their green color
5. Chlorophyll absorbs the energy of..... food to allow the plant makes its own by .....process.
6. Cells of animals don't have definite shapes due to the absence of.....
7. The body of a bird has. .... that give this bird its definite shape.

**Give reasons for:**

1. Plant cell has a definite shape



2. Chlorophyll absorbs the energy of the sunlight.

3. Mitochondria act as electrical power stations in cities.

4. Vacuoles act as storehouse in cities.

**What happens if...**

1. The animal cell is surrounded by cell wall

2. There is no chloroplasts in plant cells

3. There is no bones found in the body of the cat



## STEM: career and cell biology

## Careers and Cell Biology:

- Cells are very tiny, where the diameter of an animal cell is about (0.001 cm).
- Cell biologists use microscopes to magnify cells so they seem larger.
- **Cell biologists work in laboratories and do experiments to study:**

-How cells work inside the living organisms.

-How cells respond to different variables.

\* الخلايا صغيرة جدا ، حيث يبلغ قطر الخلية الحيوانية حوالي (0.001 سم)

\* يستخدم علماء الأحياء الخلوية المجاهر لتكبير الخلايا بحيث تبدو أكبر

\* يعمل علماء الأحياء الخلوية في المختبرات ويقومون بتجارب للدراسة

كيف تعمل الخلايا داخل الكائنات الحية -

كيف تستجيب الخلايا للمتغيرات المختلفة -

- **Cell biologists analyze data and present their conclusions to other researchers, where:**

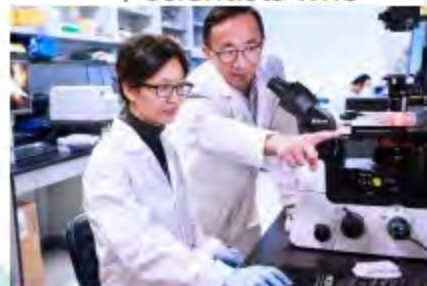
-Some cell biologists work with doctors to watch how cells can work to repair body parts or how cells respond to different medicines.

-Some other cell biologists work in agriculture to study how plant cells respond to different environmental factors

- يعمل بعض علماء الأحياء الخلوية مع الأطباء لمشاهدة كيفية عمل الخلايا لإصلاح أجزاء الجسم أو - كيفية استجابة المكالمات للأدوية المختلفة

## Note

Cell biologists are scientists who





- يعمل بعض علماء الأحياء الخلوية الآخرين في الزراعة لدراسة كيفية استجابة الخلايا النباتية للعوامل البيئية المختلفة

### Staining Cells:

-Cells are usually clear and colorless, so it is hard to see their structures under microscope.

-Stains (dyes) are used to add color and make the cell's structures more visible..

-There are different types of stains, where some stains are used to highlight one part of cells and make it more visible such as "methylene blue dye that helps you see the nucleus as a blue area in a sample of cheek lined membrane cells.

### تلطيخ الخلايا:

-الخلايا عادة ما تكون واضحة وعديمة اللون ، لذلك من الصعب رؤية هياكلها تحت المجهر.

-تستخدم البقع (الأصبغ) لإضافة اللون وجعل هياكل الخلية أكثر وضوحا..

-هناك أنواع مختلفة من البقع ، حيث تستخدم بعض البقع لإبراز جزء واحد من الخلايا وجعلها أكثر وضوحا مثل " صبغة الميثيلين الزرقاء التي تساعدك على رؤية النواة كمنطقة زرقاء في عينة من خلايا الغشاء المبطن بالفحص.

### Cells in 3D:

Scientists have built a microscope that shows the cell in 3D, which means that they can see the top, sides and layers of a cell, where:

- The 3D microscope takes pictures of a cell in layers
- Then, a computer puts these layers together.
- Finally, colors are added to the formed image

The 3D microscope can help :

- Cell biologists learn more about cell components and how cells divide.







- Doctors to treat cancer which is caused by cells that divide too quickly.

Check your understanding

قام العلماء ببناء مجهر يظهر الخلية في 30 ، مما يعني أنه يمكنهم رؤية الجزء العلوي والجوانب والطبقات من الخلية ، حيث:

-المجهر 3 d يأخذ صوراً لخلية في طبقات

-ثم ، جهاز كمبيوتر يضع هذه الطبقات معا.

-أخيرا ، تتم إضافة الألوان إلى الصورة المشكّلة

3d المجهر يمكن أن تساعد:

-علماء الأحياء الخلية معرفة المزيد عن مكونات الخلية وكيف تنقسم الخلايا.

-الأطباء لعلاج السرطان الذي تسببه الخلايا التي تنقسم بسرعة كبيرة.

تحقق من فهمك

## Lesson 6 exercises

Choose the correct answer:

1. Cell biologists use microscopes to magnify..... to appear larger

a. stones      b. bricks      c. cells      d. rocks

2. Cell biologists do experiments and analyze data to study all the following.

Except.....

a. how cells respond to different medicines.

b. how rocks are formed on Earth's surface.

c. how cells can work to repair body parts.





3. The microscope that helps us to see the top, sides and layers of the cell

**Complete the following sentences using the words below:**

**(methylene blue-microscope- agriculture-cell biologists-doctors)**

1. Cell biologists use .....to magnify cells of bacteria.
2. Cell biologists work in..... to study plant cells and their respond to different environmental factors
3. Cell biologists work with ..... to watch how cells can work to repair the human body parts
4. To see the nucleus of a cell under microscope, we can stain the cell with.....
5. The 3D microscope can help..... learn more about how cells divide

**Give reasons for:**

1. Some cell biologists work with doctors.

.....

2. We must stain cells before examining them under microscope

.....

**What happens if...?**

We stain a sample of cheek cells with methylene blue dye

.....